# NASA's Systems Engineering Competencies

**January 18, 2006**

| Systems Engineering Competencies* | |
|---|---|
| **Competency Area: 1.0 Concepts and Architecture** | **Competency Area: 6.0 NASA Internal and External Environments** |
| 1.1 Mission Needs Statement | 6.1 Agency Structure, Mission, and Internal Goals |
| 1.2 System Environments | 6.2 NASA PM/SE Procedures and Guidelines |
| 1.3 Trade Studies | 6.3 External Relationships |
| 1.4 System Architecture | |
| **Competency Area: 2.0 System Design** | **Competency Area: 7.0 Human Capital Management** |
| 2.1 Stakeholder Expectation Definition & Management | 7.1 Technical Staffing and Performance |
| 2.2 Technical Requirements Definition | 7.2 Team Dynamics and Management |
| 2.3 Logical Decomposition | |
| 2.4 Design Solution Definition | |
| **Competency Area: 3.0 Production, Product Transition, Operations** | **Competency Area: 8.0 Security, Safety and Mission Assurance** |
| 3.1 Product Implementation | 8.1 Security |
| 3.2 Product Integration | 8.2 Safety and Mission Assurance |
| 3.3 Product Verification | |
| 3.4 Product Validation | |
| 3.5 Product Transition | |
| 3.6 Operations | |
| **Competency Area: 4.0 Technical Management** | **Competency Area: 9.0 Professional and Leadership Development** |
| 4.1 Technical Planning | 9.1 Mentoring and Coaching |
| 4.2 Requirements Management | 9.2 Communication |
| 4.3 Interface Management | 9.3 Leadership |
| 4.4 Technical Risk Management | |
| 4.5 Configuration Management | |
| 4.6 Technical Data Management | |
| 4.7 Technical Assessment | |
| 4.8 Technical Decision Analysis | |
| **Competency Area: 5.0 Project Management and Control** | **Competency Area: 10.0 Knowledge Management** |
| 5.1 Acquisition Strategies and Procurement | 10.1 Knowledge Capture and Transfer |
| 5.2 Resource Management | |
| 5.3 Contract Management | |
| 5.4 Systems Engineering Management | |

***** Compiled via aligning of SE Competencies/ Processes/ Functions/ Task from Centers (MSFC, GSFC, JSC, KSC, ARC,) Agency (SE DACUM; ES NPR – DRAFT; APPL's PMDP Competency Model NESC;) and other external SE Sources (DoD, INCOSE)

## Description of Proficiency Levels Associated with the APPEL Model for Systems Engineers

To determine how best to proceed after entering the NASA workforce and progress through the technical professional development model, it is helpful to understand the definition of each level. The following table is intended as a guide for use with the technical development model for systems engineers.

| | SE Proficiency Level I | SE Proficiency Level II | SE Proficiency Level III | SE Proficiency Level IV |
|---|---|---|---|---|
| **Engineering Leadership** | Technical Engineer / Project Team Member | Subsystem Lead | Project Systems Engineer | Program Systems Engineer or Center/Agency Chief Engineer |
| **Description of Role/ Responsibility** | Performs fundamental and routine SE activities while supporting a Level II-IV systems engineer as a member of a project team | Performs SE activities for a subsystem or small project (e.g. no more than two simple internal/external interfaces, simpler contracting processes, smaller team/budget, shorter duration) | Performs as a systems engineer for a complex project (e.g. several distinct subsystems or other defined services, capabilities, or products and their associated interfaces) | Oversees SE activities for a program with several systems and/or establishes SE policies at the Agency or Center level. |
| **Level of Expertise (LEO)/ Competency to Attain Proficiency Level** | Practitioners have obtained a working knowledge of technical integration, systems engineering (SE) and project management (PM) concepts and tools and performed tasks and activities to support and contribute to a project. They demonstrated an awareness and understanding of NASA's SE and PM tools, techniques, and lexicon. They have sufficient experience and responsibility and are prepared to contribute to fundamental and routine SE activities. | Practitioners participated in or led SE activities (e.g. requirements development, budget and schedule development, risk management). They demonstrated the application of SE/PM tools, techniques, and lexicon at the project subsystem level, including use of SE/PM best practices. They have sufficient experience and responsibility and are prepared to lead SE and technical integration activities for a subsystem or small project. | Practitioners have taken a significant leadership role in multiple phases of a project life cycle managing both programmatic and technical aspects and/or managing all technical integration and SE functions for a subsystem or small project. They demonstrated the integration of SE/PM tools, techniques, and best practices across subsystems at the project level. They have sufficient experience and responsibility and are prepared for a technical leadership role in support of a major system or project | Practitioners will have contributed to Agency goals and be effective in managing programmatic, technical, and strategic interfaces both internal and external to the Agency. They demonstrated superior competencies in all Systems Engineering formulation and implementation activities. They have sufficient experience and responsibility and are prepared for a technical leadership role at the program, center, or agency level. |
| **Validation of Levels** | Practitioner's immediate supervisor | Center Peer Group and EDP panel | Center Peer Group and EDP panel | Center Peer Group, EDP and Agency-wide panels |
| **Learning and Development emphasis** | The emphasis at Level I is knowledge and understanding of technical integration, SE and basic project management. | The emphasis at Level II is leadership application and participation in SE. | The emphasis at Level III is the directing, structuring, and integration activities of SE. | The emphasis at Level IV is on the strategy for SE of large complex initiatives and the strategy and management of Agency initiatives. |

## Structure of the Systems Engineering Competency Framework

**The SE Competencies are structured as follows:**

1) Competency Areas: These describe, in broad terms, what is expected of Systems Engineer personnel in terms of particular components or functions of the job.
2) Competencies: These express the overall knowledge, skills, behaviors that SEs are expected to posses and/or perform as a part of their job.
3) Competency Elements: Each Competency Area and Competency consists of Competency Elements that describe the specific knowledge, skills, behaviors, which can be measured against established standards, can be improved via training and development activities, and correlate to performance on the job.
4) Proficiency Level Descriptions: These specify the knowledge/performance to be achieved in order to demonstrate successful mastery of the competency and are expressed in terms of levels.
5) HQ courses, Center courses, OJL activities, Other learning activities, Assessment Guidelines: These outline the required/suggested courses and activities to obtain proficiency in the competencies by level. The Assessment Guidelines indicate the evaluation and/or assessment of the competencies by level and are used as entry/exit criteria for each level of development.
6) The Competency framework is hierarchal and the numbering scheme is as follows:

**Competency Area – #.0**
**Competency – #.# – the first number indicates the Competency Area the competency falls into, the second is the Competency number**
**Competency Element - #.#.# - the first and second numbers indicate the Competency Area and Competency, respectively, that the Element is related to, the third is the particular Element number**

| Competency Area: 1.0 Concepts and Architecture | | | | |
|---|---|---|---|---|
| **Competency: 1.1 Mission Needs Statement** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **1.1.1 Mission Need**<br>a. Identify need<br>b. Identify basis of need | **Aware** that projects start with users having an unsatisfied need | **Able to** (for a subsystem or small project):<br>• Identify the users<br>• Distinguish between what the users want and what the users need | **Able to** (for a system):<br>• Identify the users<br>• Distinguish between what the users want and what the users need | **Able to** (for a program):<br>• Identify the users<br>• Distinguish between what the users want and what the users need |
| **1.1.2 Current Situation**<br>a. Describe current situation<br>b. Identify deficiencies of situation<br>c. Identify what works in current situation | **Contribute to** definition of the current situation to include what does and doesn't work | **Able to** (for a subsystem or small project) describe the current situation to include what does and doesn't work | **Able to** (for a system) describe the current situation to include:<br>• What does and doesn't work<br>• What has and hasn't worked in similar projects | **Able to** (for a program) describe the current situation to include:<br>• What does and doesn't work<br>• What has and hasn't worked in similar programs |
| **1.1.3 Mission Needs Statement Formulation**<br>a. Get agreement on problem definition<br>b. Define desired outcomes<br>c. Define success criteria<br>d. Document Need | **Contribute to** preparation of the mission needs statement | **Able to** (for a subsystem or small project):<br>• Create consensus regarding the problem definition<br>• Describe, identify or define desired outcomes and success criteria<br>• Write a mission needs statement | **Able to** (for a system) create consensus regarding the problem definition<br><br>**Direct** (for a system):<br>• Description, identification or definition of desired outcomes and success criteria<br>• Drafting of a mission needs statement | **Able to** (for a program) create consensus regarding the problem definition<br><br>**Direct** (for a program):<br>• Description, identification or definition of desired outcomes and success criteria<br>• Drafting of a mission needs statement |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 1.0 Concepts and Architecture | | | | |
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| **Competency: 1.2 System Environments** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **1.2.1 System Environment Identification**<br>a. Identify constraints<br>b. Identify expected system environment<br>c. Analyze/quantify expected environment | **Involved in** identifying constraints and the expected system environment<br><br>**Able to** analyze/quantify expected environment | **Able to** (for a subsystem or small project):<br>• Identify constraints<br>• Identify expected system environment<br>• Analyze/quantify expected environment | **Direct** (for a system):<br>• Identification of constraints<br>• Identification of expected system environment<br>• Analysis/quantification of expected environment | **Direct**(for a program):<br>• Identification of constraints<br>• Identification of expected system environment<br>• Analysis/quantification of expected environment |
| **1.2.2 Design Guidance**<br>a. Establish margin philosophy against the expected environment<br>b. Establish design guidance for the expected environment | **Understand** the purpose of having a margin philosophy against the expected environment and how that leads to design guidance<br><br>**Apply** provided design guidance | **Apply** (for a subsystem or small project):<br>• Margin philosophy against the expected environment<br>• Design guidance | **Establish** (for a system):<br>• Margin philosophy against the expected environment<br>• Design guidance | **Establish** (for a program):<br>• Margin philosophy against the expected environment<br>• Design guidance<br><br>**Define** Agency/Center design guidance policies |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 1.0 Concepts and Architecture | | | | |
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| **Competency: 1.3 Trade Studies** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **1.3.1 Concept Definition**<br>a. Define scope options<br>b. Define operations concept<br>c. Define technical solution options | **Contribute to** definition of scope options<br><br>**Understand** the need for an operations concept early in the project | **Able to** define (for a subsystem or small project):<br>• Scope options<br>• Technical solution options<br><br>**Contribute to** (for a subsystem or small project) development of the operations concept | **Direct** (for a system):<br>• Definition of scope options<br>• Definition of technical solution options<br>• Development of the operations concept | **Direct** (for a program):<br>• Definition of scope options<br>• Definition of technical solution options<br>• Development of the operations concept |
| **1.3.2 System Model**<br>a. Create system model<br>b. Validate system model<br>c. Operate system model<br>d. Correlate system model with operational data | **Contribute to:**<br>• Creation of system model<br>• Validation of system model<br>• Correlation of system model with operational data<br><br>**Able to** operate a system model | **Able to** (for a subsystem or small project):<br>• Create, validate, and operate a system model<br>• Correlate a system model with operational data | **Direct** (for a system):<br>• Creation, validation, and operation a system model<br>• Correlation of system model with operational data | **Direct** (for a program):<br>• Creation, validation, and operation a system model<br>• Correlation of system model with operational data |
| **1.3.3 System Performance**<br>a. Evaluate possible concepts<br>b. Select technical solution | **Contribute to:**<br>• Evaluation of possible concepts<br>• Recommendation of a technical solution that balances technical and non technical features of the system | **Able to** (for a subsystem or small project):<br>• Evaluate possible concepts<br>• Recommend a technical solution that balances technical and non technical features of the system | **Direct** (for a system):<br>• Evaluation of possible concepts<br>• Selection of a technical solution that balances technical and non technical features of the system | **Direct** (for a program):<br>• Evaluation of possible concepts<br>• Selection of a technical solution that balances technical and non technical features of the system |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 1.0 Concepts and Architecture | | | | |
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| **Competency: 1.4 System Architecture** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **1.4.1 Functional Analysis**<br>a. Establish system boundaries<br>b. Define architecture functions<br>c. Analyze architecture functional performance | **Aware** that overall architecture can be broken into functional segments<br><br>**Able to** analyze functional performance of at least one segment of the architecture | **Able to** (for a subsystem or small project):<br>• Identify system boundaries including external interfaces<br>• Segment an architecture into functions<br>• Analyze functional performance of multiple segments | **Direct** (for a system):<br>• Identification of system boundaries including external interfaces<br>• Segmentation of an architecture into functions<br>• Functional analysis of all systems architecture segments | **Direct** (for a program):<br>• Identification of system boundaries including external interfaces<br>• Segmentation of an architecture into functions<br>• Functional analysis of all systems architecture segments |
| **1.4.2 Subsystem Mapping**<br>a. Map architecture functions to subsystems<br>b. Define subsystem relationships<br>c. Identify internal interfaces | **Aware** that architecture functions become subsystems<br><br>**Contribute to:**<br>• Definition of subsystem relationships<br>• Identification of internal interfaces | **Able to** define (for a subsystem or small project):<br>• Subsystems from the architecture functions<br>• Subsystem relationships<br>• Internal interfaces | **Direct** definition of (for a system):<br>• Subsystems from the architecture functions<br>• Subsystem relationships<br>• Internal interfaces | **Direct** definition of (for a program):<br>• Subsystems from the architecture functions<br>• Subsystem relationships<br>• Internal interfaces |
| **1.4.3 Systems Architecture Documentation**<br>a. Document the systems architecture | **Contribute to** documentation of systems architecture | **Participate in** documentation of the systems architecture | **Able to** (for a system) document systems architecture | **Direct** (for a program) documentation of systems architecture |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 2.0 System Design | | | | |
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| **Competency: 2.1 Stakeholder Expectation Definition & Management** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **2.1.1 Stakeholder Identification**<br>a. Identify all stakeholders | **Aware** that stakeholders must be involved early in the project lifecycle | **Able to** (for a subsystem or small project) identify project stakeholders | **Able to** (for a system) identify project stakeholders | **Able to** identify program stakeholders |
| **2.1.2 Stakeholder Expectation Definition**<br>a. Elicit stakeholder expectations<br>b. Define stakeholder expectation in acceptable statements<br>c. Generate MOEs from stakeholder expectation statements | **Contribute to:**<br>• Translation of stakeholder expectations into acceptable statements<br>• Creation of MOEs from stakeholder expectation statements | **Contribute to** (for a subsystem or small project) obtaining stakeholder expectations<br><br>**Able to** (for a subsystem or small project):<br>• Translate stakeholder expectations into acceptable statements<br>• Create MOEs from stakeholder expectation statements | **Direct** (for a system):<br>• Obtaining of stakeholder expectations<br>• Translation of stakeholder expectations into acceptable statements<br>• Creation of MOEs from stakeholder expectation statements | **Direct** (for a program):<br>• Obtaining of stakeholder expectations<br>• Translation of stakeholder expectations into acceptable statements<br>• Creation of MOEs from stakeholder expectation statements |
| **2.1.3 Stakeholder Expectation Validation**<br>a. Validate traceability of defined stakeholder expectation statements<br>b. Obtain stakeholder buy-in of validated set of expectations<br>c. Baseline stakeholder expectations | **Contribute to:**<br>• Validation of stakeholder expectations statements<br>• Baselining of stakeholder expectations<br><br>**Aware** that stakeholder buy-in must be obtained | **Able to** (for a subsystem or small project):<br>• Validate stakeholder expectations statements<br>• Baseline stakeholder expectations<br><br>**Contribute to** (for a subsystem or small project) obtaining stakeholder buy-in of validated expectations | **Direct** (for a system):<br>• Validation of stakeholder expectations statements<br>• Baselining of stakeholder expectations<br><br>**Able to** (for a system) obtain stakeholder buy-in of validated expectations | **Direct** (for a program):<br>• Validation of stakeholder expectations statements<br>• Generation of baselined stakeholder expectations<br><br>**Able to** (for a program) obtain stakeholder buy-in of validated expectations |
| **2.1.4 Stakeholder Expectation Management**<br>a. Manage expectations of stakeholders | **Aware** that stakeholders expectations must be managed throughout the project lifecycle | **Participate in** management of stakeholders expectations throughout the project lifecycle | **Able to** (for a system) manage stakeholders expectations throughout the project lifecycle | **Able to** (for a program) manage stakeholders expectations throughout the project lifecycle<br><br>**Define** Agency/Center stakeholder expectation management policies |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |

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| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 2.0 System Design | | | | |
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| **Competency: 2.2 Technical Requirements Definition** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **2.2.1 Requirements Scope**<br>a. Analyze scope of the technical problem<br>b. Define design and product constraints | **Aware** that<br>• Design cannot begin until technical scope has been defined<br>• Design and product constraints will impact the product | **Aware of** technology developments<br><br>**Contribute to** (for a subsystem or small project) definition of:<br>• Technical problem scope<br>• Design and product constraints | **Aware of** technology developments<br><br>**Able to** define (for a system):<br>• Technical problem scope<br>• Design and product constraints | **Aware of** technology developments<br><br>**Able to** define:<br>• Technical problem scope (for a program)<br>• Design and product constraints (for Agency/Center) |
| **2.2.2 Conversion from Expectations to Requirements**<br>a. Define functional and behavioral expectations in acceptable technical terms<br>b. Define the performance requirements for each defined functional and behavioral expectation<br>c. Define technical requirements in acceptable "shall" statements | **Contribute to:**<br>• Conversion of functional and behavioral expectations into technical terms with performance requirements<br>• Expression of technical requirements in an acceptable form | **Able to** (for a subsystem or small project):<br>• Convert functional and behavioral expectations into technical terms with performance requirements<br>• Express technical requirements in an acceptable form | **Direct** (for a system):<br>• Conversion of functional and behavioral expectations into technical terms with performance requirements<br>• Expression of technical requirements in an acceptable form | **Direct** (for a program):<br>• Conversion of functional and behavioral expectations into technical terms with performance requirements<br>• Expression of technical requirements in an acceptable form |
| **2.2.3 Conversion from Requirements to Technical Performance Measures**<br>a. Define measures of performance (MOPs) for each measure of effectiveness (MOE)<br>b. Define technical performance measures (TPMs) | **Contribute to** definition of MOPs and TPMs | **Able to** (for a subsystem or small project) define MOPs and TPMs | **Direct** (for a system) definition of MOPs and TPMs | **Direct** (for a program) definition of MOPs and TPMs |

| **2.2.4 Requirements Documentation**<br>a. Validate the technical requirements<br>b. Baseline technical requirements | **Contribute to:**<br>• Validation of requirements<br>• Development of specification doc. | **Able to** (for a subsystem or small project) validate requirements<br><br>**Contribute to** (for a subsystem or small project) development of specification doc. | **Direct** (for a system):<br>• Validation of requirements<br>• Development of specification doc. | **Direct** (for a program):<br>• Validation of requirements<br>• Development of specification doc.<br><br>**Define** Agency/Center technical requirements definition policies |
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| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 2.0 System Design | | | | |
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| **Competency: 2.3 Logical Decomposition** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **2.3.1 Requirements Flow**<br>a. Decompose requirements<br>b. Allocate requirements<br>c. Resolve derived requirements conflicts | **Contribute to:**<br>• Decomposition of requirements<br>• Allocation of requirements<br>• Identification and resolution of requirements conflicts | **Able to** (for a subsystem or small project):<br>• Decompose requirements<br>• Allocate requirements<br>• Identify and resolve requirements conflicts | **Direct** (for a system):<br>• Decomposition of requirements<br>• Allocation of requirements<br>• Identification and resolution of requirements conflicts | **Direct** (for a program):<br>• Decomposition of requirements<br>• Allocation of requirements<br>• Identification and resolution of requirements conflicts |
| **2.3.2 Derived Requirements Documentation**<br>a. Validate derived requirements<br>b. Baseline derived requirements | **Contribute to:**<br>• Validation of derived requirements<br>• Development of specification document | **Able to** (for a subsystem or small project):<br>• Validate derived requirements<br>• Develop specification document | **Direct** (for a system):<br>• Validation of derived requirements<br>• Development of specification document | **Direct** (for a program):<br>• Validation of derived requirements<br>• Development of specification document<br><br>**Define** Agency/Center logical decomposition policies |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 2.0 System Design | | | | |
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| **Competency: 2.4 Design Solution Definition** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **2.4.1 Alternative Designs**<br>a. Define alternative design solutions<br>b. Analyze alternative design solutions<br>c. Select best design solution alternative | **Contribute to:**<br>• Definition of alternative design solutions<br>• Evaluation of alternative design solutions<br><br>**Able to** recommend best design solution | **Able to** (for a subsystem or small project):<br>• Define alternative design solutions<br>• Evaluate alternative design solutions<br>• Recommend best design solution | **Direct** (for a system):<br>• Definition of alternative design solutions<br>• Evaluation of alternative design solutions<br><br>**Able to** (for a system) select best design solution | **Direct** (for a program):<br>• Definition of alternative design solutions<br>• Evaluation of alternative design solutions<br><br>**Able to** (for a program) select best design solution |
| **2.4.2 Design Solution Documentation**<br>a. Generate full design description<br>b. Verify design solution<br>c. Baseline selected design solution | **Contribute to:**<br>• Generation of full design description<br>• Verification of the design solution<br>• Baselining of selected design solution | **Able to** (for a subsystem or small project):<br>• Generate full design description<br>• Verify the design solution<br>• Baseline selected design solution | **Direct** (for a system):<br>• Generation of full design description<br>• Verification of the design solution<br>• Baselining of selected design solution | **Direct** (for a program):<br>• Generation of full design description<br>• Verification of the design solution<br>• Baselining of selected design solution<br><br>**Define** Agency/Center design solution policies |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

## Competency Area: 3.0 Product, Product Transition, Operations

### Competency: 3.1 Product Implementation

| Competency Elements and Descriptions | Proficiency Level Descriptions | | | |
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| | Level 1 | Level 2 | Level 3 | Level 4 |
| **3.1.1 Product Implementation Preparation**<br>a. Begin enabling product development or acquisition<br>b. Begin development of next lower-level products<br>c. Prepare product implementation strategy<br>d. Review existing product configuration documentation | **Aware** that product implementation requires enabling products and lower level products<br><br>**Contribute** to review of existing product configuration documentation | **Contribute to** (for a subsystem or small project):<br>• Acquisition or development of enabling products<br>• Development of next lower-level products<br>• Readiness of existing product configuration documentation<br>• Development of the product implementation strategy | **Ensure** (for a system):<br>• Acquisition or development of enabling products<br>• Development of next lower-level products<br>• Readiness of existing product configuration documentation<br><br>**Develop** (for a system) the product implementation strategy | **Ensure** (for a program):<br>• Acquisition or development of enabling products<br>• Development of next lower-level products<br>• Readiness of existing product configuration documentation<br><br>**Direct** (for a program) development of the product implementation strategy |
| **3.1.2 Product Purchase**<br>a. Review product technical information<br>b. Prepare vendor requests<br>c. Assist product inspection<br>d. Assess product validation status<br>e. Assess enabling product status | **Contribute** to product purchase by:<br>• Reviewing product technical information<br>• Assisting product inspection<br>• Assessing product validation status<br>• Assessing enabling product status | **Able to** (for a subsystem or small project) provide SE participation in the product purchase:<br>• Review of product technical information<br>• Assess product validation status<br>• Assess enabling product status<br><br>**Contribute to** (for a subsystem or small project) SE participation in the product purchase:<br>• Preparation of vendor requests<br>• Product inspection | **Direct** (for a system) SE participation in the product purchase:<br>• Review of product technical information<br>• Preparation of vendor requests<br>• Product inspection<br>• Assessment of product validation status<br>• Assessment of enabling product status | **Direct** (for a program) SE participation in the product purchase:<br>• Review of product technical information<br>• Preparation of vendor requests<br>• Assisting product inspection<br>• Assessment of product validation status<br>• Assessment of enabling product status |
| **3.1.3 Product Fabrication**<br>a. Evaluate readiness of implementation of enabling products | **Contribute** to product fabrication by:<br>• Enabling products status assessment<br>• Product fabrication monitoring | **Able to** (for a subsystem or small project) provide SE participation in product fabrication:<br>• Assess enabling products status | **Direct** (for a system) SE participation in product fabrication:<br>• Assessment of enabling products status<br>• Monitoring product | **Direct** (for a program) SE participation in product fabrication:<br>• Assessment of enabling products status<br>• Monitoring product |

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| b. Fabricate product<br>c. Prepare support documentation | • Support documentation preparation | • Monitor product fabrication<br><br>**Contribute to** (for a subsystem or small project) preparation of support documentation | fabrication<br>• Preparing support documentation | fabrication<br>• Preparing support documentation |
| **3.1.4 Product Reuse**<br>a. Review product technical information<br>b. Assess supporting documentation status<br>c. Assess enabling product status<br>d. Assist in requests to acquire the product from Government source<br>e. Assist in product inspection | **Contribute** to acquiring the product for reuse by:<br>• Reviewing product technical information<br>• Assessing status of supporting documentation and user manuals<br>• Assessing enabling products status<br>• Assisting in requests to acquire the product from Government sources<br>• Assisting product inspection | **Able to** (for a subsystem or small project) provide SE participation in acquiring the product for reuse by:<br>• Review of product technical information<br>• Assessment of supporting documentation and user manuals status<br>• Assessment of enabling products status<br>• Assisting in requests to acquire the product from Government sources<br>• Product inspection | **Direct** (for a system) SE participation in acquiring the product for reuse by:<br>• Review of product technical information<br>• Assessment of supporting documentation and user manuals status<br>• Assessment of enabling products status<br>• Assisting in requests to acquire the product from Government sources<br>• Product inspection | **Direct** (for a program) SE participation in acquiring the product for reuse by:<br>• Review of product technical information<br>• Assessment of supporting documentation and user manuals status<br>• Assessment of enabling products status<br>• Assisting in requests to acquire the product from Government sources<br>• Assisting product inspection |
| **3.1.5 Product Implementation Documentation**<br>a. Capture product implementation work products | **Contribute** to capture of work products from product implementation activities | **Participate in** capture of work products from product implementation activities | **Direct** (for a system) capture of work products from product implementation activities | **Direct** (for a program) capture of work products from product implementation activities<br><br>**Define** Agency/Center product implementation policies |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

## Competency Area: 3.0 Product, Product Transition, Operations

### Competency: 3.2 Product Integration

| Competency Elements and Descriptions | Proficiency Level Descriptions | | | |
|---|---|---|---|---|
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **3.2.1 Product Integration Preparation**<br>a. Prepare product integration strategy<br>b. Review existing product configuration documentation | **Understand** integration preparation | **Contribute to** (for a subsystem or small project) development of:<br>• Product integration strategy<br>• Detailed planning for integration<br>• Integration sequence and procedures<br><br>**Ensure** (for a subsystem or small project) existing product configuration documentation will permit product integration | **Develop** (for a system) the product integration strategy<br><br>**Direct** (for a system) development of:<br>• Detailed planning for integration<br>• Integration sequence and procedures<br><br>**Ensure** (for a system) existing product configuration documentation will permit product integration | **Direct** (for a program) development of:<br>• Product integration strategy<br>• Detailed planning for integration<br>• Integration sequence and procedures<br><br>**Ensure** (for a program) existing product configuration documentation will permit product integration |
| **3.2.2 Lower Level Product Procurement**<br>a. Obtain lower level products<br>b. Confirm received products have been validated | **Aware** that lower level products must be obtained and validated | **Ensure** (for a subsystem or small project) lower level products are in place and have been validated | **Ensure** (for a system) lower level products are in place and have been validated | **Ensure** (for a program) lower level products are in place and have been validated |
| **3.2.3 Product Assembly**<br>a. Prepare integration environment<br>b. Assemble and integrate the received products | **Aware** of process to prepare integration environment<br><br>**Contribute to** assembly and integration | **Ensure** (for a subsystem or small project) readiness of:<br>• Product integration enabling products<br>• Product integration workforce<br><br>**Participate in** (for a subsystem or small project) assembly and integration of received products | **Ensure** (for a system) readiness of:<br>• Product integration enabling products<br>• Product integration workforce<br><br>**Direct** (for a system) assembly and integration of received products | **Ensure** (for a program) readiness of:<br>• Product integration enabling products<br>• Product integration workforce<br><br>**Direct** (for a program) assembly and integration of received products |
| **3.2.4 Product Integration Documentation**<br>a. Prepare product support documentation<br>b. Capture product integration work products | **Contribute to** capture of work products and related information from product integration activities | **Participate in** capture of work products and related information from product integration activities | **Direct** (for a system) capture of work products and related information from product integration activities | **Direct** (for a program) capture of work products and related information from product integration activities<br><br>**Define** Agency/Center product integration policies |

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| HQ courses | | | | |
| Center courses | | | | |
| OJL activities | | | | |
| Other learning activities | | | | |
| Assessment | | | | |

| Competency Area: 3.0 Product, Product Transition, Operations | | | | |
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| **Competency: 3.3 Product Verification** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **3.3.1 Product Verification Preparation**<br>a. Prepare to conduct product verification | **Aware of** steps to prepare for product verification | **Review** (for a subsystem or small project) product verification plan<br><br>**Contribute to** (for a subsystem or small project):<br>• Obtaining product verification enabling products<br>• Obtaining specification and configuration baseline against which the verification is to be made<br>• Readiness of verification environment | **Review** (for a system) product verification plan<br><br>**Ensure** (for a system):<br>• Product verification enabling products are obtained<br>• Specification and configuration baseline against which the verification is to be made are obtained<br>• Readiness of verification environment | **Review** (for a program) product verification plan<br><br>**Ensure** (for a program):<br>• Product verification enabling products are obtained<br>• Specification and configuration baseline against which the verification is to be made are obtained<br>• Readiness of verification environment |
| **3.3.2 Product Verification Execution**<br>a. Perform product verification<br>b. Analyze product verification outcomes | **Contribute to:**<br>• Product verification<br>• Analysis of product verification outcomes<br><br>**Able to:**<br>• Identify verification anomalies or conformance | **Participate in** (for a subsystem or small project):<br>• Product verification<br>• Analysis of product verification outcomes<br>• Identification of anomalies and corrective action recommendations<br><br>**Establish** (for a subsystem or small project): product conformance | **Direct** (for a system):<br>• Product verification<br>• Analysis of product verification outcomes<br>• Identification of anomalies and corrective action recommendations<br><br>**Able to** (for a system):<br>• Establish product conformance or<br>• Select corrective action | **Direct** (for a program):<br>• Product verification<br>• Analysis of product verification outcomes<br>• Identification of anomalies and corrective action recommendations<br><br>**Able to** (for a system):<br>• Establish product conformance or<br>• Select corrective action |
| **3.3.3 Product Verification Documentation**<br>a. Prepare product verification report<br>b. Capture product verification work products | **Contribute to:**<br>• Preparation of product verification report<br>• Capture of work products and related information from product verification activities | **Participate in**:<br>• Preparation of product verification report<br>• Capture of work products and related information from product verification activities | **Direct** (for a system):<br>• Preparation of product verification report<br>• Capture of work products and related information from product verification activities | **Direct** (for a program):<br>• Preparation of product verification report<br>• Capture of work products and related information from product verification activities<br><br>**Define** Agency/Center product verification policies |
| **HQ courses** | | | | |
| **Center courses** | | | | |

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| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

## Competency Area: 3.0 Product, Product Transition, Operations

### Competency: 3.4 Product Validation

| Competency Elements and Descriptions | Proficiency Level Descriptions | | | |
|---|---|---|---|---|
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **3.4.1 Product Validation Preparation**<br>a. Prepare to conduct product validation | **Aware of** steps to prepare for product validation | **Review** (for a subsystem or small project) product validation plan<br><br>**Contribute to** (for a subsystem or small project):<br>• Obtaining product validation enabling products<br>• Getting the end product to be validated in place<br>• Obtaining stakeholder expectations baseline against which the validation is to be made<br>• Readiness of validation environment | **Review** (for a system) product validation plan<br><br>**Ensure** (for a system):<br>• Product validation enabling products are obtained<br>• Getting the end product to be validated in place<br>• Stakeholder expectations baseline against which the validation is to be made is obtained<br>• Readiness of validation environment | **Review** (for a program) product validation plan<br><br>**Ensure** (for a program):<br>• Product validation enabling products are obtained<br>• Getting the end product to be validated in place<br>• Stakeholder expectations baseline against which the validation is to be made is obtained<br>• Readiness of validation environment |
| **3.4.2 Product Validation Execution**<br>a. Perform product validation<br>b. Analyze product validation outcomes | **Contribute to:**<br>• Execution of product validation<br>• Analysis of product validation outcomes<br><br>**Able to:**<br>• Identify validation anomalies or conformance | **Participate in** (for a subsystem or small project):<br>• Product validation<br>• Analysis of product validation outcomes<br>• Identification of anomalies and corrective action recommendations<br><br>**Establish** (for a subsystem or small project): product conformance | **Direct** (for a system):<br>• Product validation<br>• Analysis of product validation outcomes<br>• Identification of anomalies and corrective action recommendations<br><br>**Able to** (for a system):<br>• Establish product conformance or<br>• Select corrective action | **Direct** (for a program):<br>• Product validation<br>• Analysis of product validation outcomes<br>• Identification of anomalies and corrective action recommendations<br><br>**Able to** (for a system):<br>• Establish product conformance or<br>• Select corrective action |
| **3.4.3 Product Validation Documentation**<br>a. Prepare product validation report<br>b. Capture product validation work products | **Contribute to:**<br>• Preparation of product validation report<br>• Capture of work products and related information from product validation activities | **Participate in**:<br>• Preparation of product validation report<br>• Capture of work products and related information from product validation activities | **Direct** (for a system):<br>• Preparation of product validation report<br>• Capture of work products and related information from product validation activities | **Direct** (for a program):<br>• Preparation of product validation report<br>• Capture of work products and related information from product validation activities<br><br>**Define** Agency/Center product validation policies |
| **HQ courses** | | | | |

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| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 3.0 Product, Product Transition, Operations | | | | |
|---|---|---|---|---|
| **Competency: 3.5 Product Transition** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **3.5.1 Product Transition Preparation**<br>a. Determine type of product transition<br>b. Identify special transition procedures and enabling product needs<br>c. Prepare end product for transition | **Aware of** steps to prepare for product transition | **Participate in** (for a subsystem or small project) preparing:<br>• Documentation that will accompany the product<br>• Product transition procedures<br>• Personnel availability and skills<br>• Packaging material, handling equipment, storage facilities, and shipping services<br><br>**Oversee** (for a subsystem or small project) packaging, storing, moving end product to shipping location | **Develop** (for a system) product transition strategy<br><br>**Ensure** (for a system) the readiness of:<br>• Documentation that will accompany the product<br>• Product transition procedures<br>• Personnel availability and skills<br>• Packaging material, handling equipment, storage facilities, and shipping services<br><br>**Oversee** (for a system) packaging, storing, moving end product to shipping location | **Direct** (for a program) development of product transition strategy<br><br>**Ensure** (for a program) the readiness of:<br>• Documentation that will accompany the product<br>• Product transition procedures<br>• Personnel availability and skills<br>• Packaging material, handling equipment, storage facilities, and shipping services<br><br>**Oversee** (for a program) packaging, storing, moving end product to shipping location |
| **3.5.2 Product Transition Execution**<br>a. Transition product to end user<br>b. Prepare sites for end product | **Aware** that product transition can be to the next higher level for integration or to end user | **Ensure** (for a subsystem or small project):<br>• End product and its documentation transition to customer<br>• Receiving sites are ready for end product | **Ensure** (for a system):<br>• End product and its documentation transition to customer<br>• Receiving sites are ready for end product | **Ensure** (for a program):<br>• End product and its documentation transition to customer<br>• Receiving sites are ready for end product |
| **3.5.3 Product Transition Documentation**<br>a. Capture product transition work products | **Contribute to** capture of work products and related information from product transition activities | **Participate in** capture of work products and related information from product transition activities | **Direct** (for a system) capture of work products and related information from product transition activities | **Direct** (for a program) capture of work products and related information from product transition activities<br><br>**Define** Agency/Center product transition policies |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |

| Assessment | | | | |
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| Competency Area: 3.0 Product, Product Transition, Operations | | | | |
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| **Competency: 3.6 Operations** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **3.6.1 Operations Planning**<br>a. Develop operations plan | **Contribute to** development of the operations plan | **Participate in** development of the operations plan | **Direct** (for a system) development of the operations plan | **Direct** (for a program) development of the operations plan |
| **3.6.2 Operations Execution**<br>a. Manage Operations | **Contribute to** operation of the product | **Participate in** (for a subsystem or small project) operation of the product | **Participate in** (for a system) operation of the product | **Participate in** (for a program) operation of the product |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 4.0 Technical Management | | | | |
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| **Competency: 4.1 Technical Planning** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **4.1.1 Technical Planning Preparation**<br>a. Prepare a planning strategy for common technical processes<br>b. Define technical work to be done<br>c. Schedule, organize and cost the technical work | **Aware** that common technical processes need to be planned<br><br>**Contribute to** technical planning by providing inputs as requested | **Participate in** (for a subsystem or small project):<br>• Collection of information for technical planning<br>• Definition of technical work to be done<br>• Schedule, organize and cost the technical work | **Develop** (for a system) or update planning strategies for common technical processes<br><br>**Able to** (for a system):<br>• Collect information for technical planning<br>• Define technical work to be done<br>• Schedule, organize and cost the technical work | **Develop** (for a program) or update planning strategies for common technical processes<br><br>**Direct** (for a program):<br>• Collection of information for technical planning<br>• Definition of technical work to be done<br>• Schedule, organize and cost the technical work |
| **4.1.2 Technical Plans Development**<br>a. Prepare Systems Engineering Management Plan (SEMP)<br>b. Prepare product verification plan<br>c. Prepare product validation plan<br>d. Prepare other technical plans as needed<br>e. Obtain stakeholder buy-in to the technical plans | **Contribute to** development of technical plans<br><br>**Aware** that stakeholders can't be ignored during technical planning | **Participate in** (for a subsystem or small project) development of formal technical plans (i.e. SEMP, Product Verification Plan, Product Validation Plan, etc)<br><br>**Able to** (for a subsystem or small project) obtain stakeholder agreements with the technical plans | **Direct** (for a system) development of formal technical plans (i.e. SEMP, Product Verification Plan, Product Validation Plan, etc)<br><br>**Able to** (for a system) obtain stakeholder agreements with the technical plans | **Direct** (for a program) development of formal technical plans (i.e. SEMP, Product Verification Plan, Product Validation Plan, etc)<br><br>**Able to** (for a program) obtain stakeholder agreements with the technical plans |
| **4.1.3 Technical Work Directives**<br>a. Issue authorized technical work directives | **Able to** follow technical work directives | **Participate in** (for a subsystem or small project) development of technical work directives | **Develop** (for a system) technical work directives | **Direct** (for a program) development of technical work directives |
| **4.1.4 Technical Planning Documentation**<br>a. Capture technical planning work products | **Contribute to** capture of work products and related information from technical planning activities | **Participate in** capture of work products and related information from technical planning activities | **Direct** (for a system) capture of work products and related information from technical planning activities | **Direct** (for a program) capture of work products and related information from technical planning activities<br><br>**Define** Agency/Center technical planning policies |

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| HQ courses | | | | |
| Center courses | | | | |
| OJL activities | | | | |
| Other learning activities | | | | |
| Assessment | | | | |

| Competency Area: 4.0 Technical Management | | | | |
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| **Competency: 4.2 Requirements Management** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **4.2.1 Requirements Management Preparation**<br>a. Prepare strategies for requirements management | **Aware of** activities to prepare for requirements management | **Contribute to** (for a subsystem or small project) strategies for requirements management | **Develop** (for a system) strategies for requirements management | **Develop** (for a program) strategies for requirements management |
| **4.2.2 Requirements Management Execution**<br>a. Document expectations and requirements in proper format<br>b. Confirm requirements baseline has been validated<br>c. Identify and propose changes to out-of-tolerance technical parameters | **Contribute to** collection of requirements for documenting<br><br>**Able to** review requirement statements to ensure compliance with guidelines | **Participate in** (for a subsystem or small project):<br>• Documenting requirements in the proper format<br>• Validating the requirements baseline<br><br>**Able to** (for a subsystem or small project) identify and propose changes to out-of-tolerance technical parameters | **Ensure** (for a system):<br>• Requirements are documented in proper format<br>• Requirements baseline is validated<br>• Identification of out-of-tolerance technical parameters<br><br>**Approve** (for a system) changes to out-of-tolerance technical parameters | **Ensure** (for a program):<br>• Requirements are documented in proper format<br>• Requirements baseline is validated<br>• Identification of out-of-tolerance technical parameters<br><br>**Approve** (for a program) changes to out-of-tolerance technical parameters |
| **4.2.3 Expectation/Requirements Traceability**<br>a. Track expectations and requirements between baselines<br>b. Establish and maintain requirements compliance matrices | **Contribute to:**<br>• Development and maintenance of compliance matrices | **Able to** (for a small project or subsystem) track between baselines<br><br>**Participate in** development and maintenance of compliance matrices | **Able to** (for a system):<br>• Track between baselines<br>• Develop and maintain compliance matrices | **Direct** (for a program):<br>• Tracking between baselines<br>• Development and maintenance of compliance matrices |
| **4.2.4 Expectation/Requirements Change Management**<br>a. Review engineering change proposals (ECPs)<br>b. Implement formal change procedures<br>c. Disseminate approved changes | **Able to** review ECPs | **Contribute to** (for a subsystem or small project):<br>• Review ECPs and provide recommendations<br>• Disseminate approved changes | **Direct** (for a system):<br>• Review ECPs and provide recommendations<br>• Implementation of change procedures<br>• Dissemination of approved changes | **Direct** (for a program):<br>• Review ECPs and provide recommendations<br>• Implementation of change procedures<br>• Disseminate approved changes |

| **4.2.5 Requirement Management Documentation**<br>a. Capture requirement management work products | **Contribute to** capture of work products from requirements management activities | **Participate in** capture of work products from requirements management activities | **Direct** (for a system) capture of work products from requirements management activities | **Direct** (for a program) capture of work products from requirements management activities<br><br>**Define** Agency/Center requirements management policies |
|---|---|---|---|---|
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 4.0 Technical Management | | | | |
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| **Competency: 4.3 Interface Management** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **4.3.1 Interface Management Preparation**<br>a. Prepare procedures for interface management | **Aware of** activities to prepare for interface management | **Contribute to** (for a subsystem or small project) development of procedures for interface management | **Develop** (for a system) procedures for interface management | **Direct** (for a program) development of procedures for interface management |
| **4.3.2 Interface Management During System Design**<br>a. Integrate interface and requirements management activities<br>b. Identify interfaces not in the stakeholder set of expectations<br>c. Document interfaces as system structure emerges<br>d. Document origin, destination, stimulus, and special characteristics of interfaces<br>e. Maintain the design solution for internal interfaces<br>f. Maintain horizontal traceability across interfaces<br>g. Confirm ICDs validated with parties on both sides of interface | **Contribute to** interface management during system design | **Participate in** interface management during system design | **Direct** (for a system) interface management during system design | **Direct** (for a program) interface management during system design |
| **4.3.3 Interface Management During Product Integration**<br>a. Review product integration procedures<br>b. Identify interface discrepancies<br>c. Confirm a pre-check is | **Contribute to** interface management during product integration | **Participate in** interface management during product integration | **Direct** (for a system) interface management during product integration | **Direct** (for a program) interface management during product integration |

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| completed on all physical interfaces<br>d. Evaluate assembled products for interface compatibility<br>e. Confirm product V/V plans include confirming interfaces<br>f. Prepare and interface evaluation report | | | | |
| **4.3.4 Interface Control Execution**<br>a. Manage interface changes with the system structure<br>b. Identify and track changes to interface documentation<br>c. Confirm interface issues are analyzed and resolved when a change affects products on both sides of the interface<br>d. Control traceability of interface changes<br>e. Disseminate approved interface change information | **Contribute to** interface control activities | **Participate in** interface control activities | **Direct** (for a system) interface control activities | **Direct** (for a program) interface control activities |
| **4.3.5 Interface Management Documentation**<br>a. Capture interface management work products | **Contribute to** capture of work products from interface management activities | **Participate** capture of work products from interface management activities | **Direct** (for a system) capture of work products from interface management activities | **Direct** (for a program) capture of work products from interface management activities<br><br>**Define** Agency/Center interface management policies |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 4.0 Technical Management | | | | |
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| **Competency: 4.4 Technical Risk Management** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **4.4.1 Technical Risk Management Preparation**<br>a. Prepare strategies to conduct technical risk management | **Aware of** activities to prepare for technical risk management | **Contribute to** development of strategies to conduct technical risk management | **Develop** (for a system) strategies to conduct technical risk management | **Direct** (for a program) development of strategies to conduct technical risk management |
| **4.4.2 Technical Risk Identification and Assessment**<br>a. Identify risks<br>b. Coordinate with stakeholders<br>c. Analyze risks for severity of consequences and likelihood of occurrence | **Contribute to:**<br>• Identification of risk<br>• Risk analysis | **Participate in** (for a subsystem or small project):<br>• Identification of risk<br>• Stakeholder coordination<br><br>**Able to** perform risk analysis | **Able to** (for a system) conduct:<br>• Risk identification<br>• Stakeholder coordination<br><br>**Direct** risk analysis | **Direct** (for a program):<br>• Identification of risk<br>• Stakeholder coordination<br>• Risk analysis |
| **4.4.3 Technical Risk Mitigation**<br>a. Prepare for technical risk mitigation<br>b. Monitor status of each technical risk<br>c. Implement technical risk mitigation and contingency action plans as triggered | **Contribute to:**<br>• Risk monitoring<br>• Development of risk mitigation/contingency action plans<br>• Implementation of plans | **Able to** recommend risks for mitigation<br><br>**Participate in**:<br>• Development of risk mitigation/contingency action plans<br>• Plan implementation | **Able to** (for a system) select risks for mitigation<br><br>**Direct** (for a system):<br>• Development of risk mitigation/contingency action plans<br>• Plan implementation | **Able to** (for a program) select risks for mitigation<br><br>**Direct** (for a program):<br>• Development of risk mitigation/contingency action plans<br>• Plan implementation |
| **4.4.4 Technical Risk Documentation**<br>a. Capture technical risk management work products | **Contribute to** capture of work products from technical risk management activities | **Participate in** capture of work products from technical risk management activities | **Direct** (for a system) capture of work products from technical risk management activities | **Direct** (for a program) capture of work products from technical risk management activities<br><br>**Define** Agency/Center technical risk management policies |
| **HQ courses** | | | | |
| **Center courses** | | | | |

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| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 4.0 Technical Management | | | | |
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| **Competency: 4.5 Configuration Management** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **4.5.1 Configuration Management Preparation**<br>a. Prepare strategies to conduct configuration management | **Aware of** activities to prepare for configuration management | **Participate in** (for a subsystem or small project) development of strategies to conduct configuration management | **Develop** (for a system) strategies to conduct configuration management | **Direct** (for a program) development of strategies to conduct configuration management |
| **4.5.2 Configuration Control Baseline**<br>a. Identify configuration control items<br>b. Establish baseline for each configuration item | **Aware of** activities to baseline a configuration | **Contribute to** (for a subsystem or small project) SE participation in configuration control baseline:<br>• Identify items to control<br>• Establish baseline | **Able to** (for a system):<br>• Identify items to be place under configuration control<br>• Establish baseline | **Direct** (for a program) SE participation in configuration control baseline:<br>• Identify items to control<br>• Establish baseline |
| **4.5.3 Configuration Control Management**<br>a. Establish configuration change process<br>b. Implement configuration change process | **Aware of** configuration change control | **Contribute to** (for a subsystem or small project) configuration change control | **Contribute to** (for a system) configuration change control | **Contribute to** (for a program) configuration change control |
| **4.5.4 Configuration Documentation Status**<br>a. Maintain configuration item description records<br>b. Maintain change records<br>c. Maintain differences between baselines | **Aware of** content of configuration control | **Contribute to** (for a subsystem or small project) identification of content for configuration control | **Able to** (for a system) identify content of configuration control | **Able to** (for a program) identify content of configuration control |
| **4.5.5 Configuration Audits**<br>a. Audit baselines<br>b. Identify risks caused by poor configuration control<br>c. Track action items to correct anomalies | **Contribute to** configuration audits | **Participate** in configuration audits | **Direct** (for a system) SE participation in configuration audits | **Direct** (for a program) SE participation in configuration audits |
| **4.5.6 Configuration** | **Contribute to** capture of work | **Participate** capture of work | **Direct** (for a system) capture of | **Direct** (for a program) capture |

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| **Management Documentation**<br>a. Capture configuration management work products | products from configuration management activities | products from configuration management activities | work products from configuration management activities | of work products from configuration management activities<br><br>**Define** Agency/Center configuration management policies |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 4.0 Technical Management | | | | |
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| **Competency: 4.6 Technical Data Management** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **4.6.1 Technical Data Management Preparation**<br>a. Prepare strategies to conduct technical data management | **Aware of** activities to prepare for technical data management | **Contribute to** (for a subsystem or small project) strategies to conduct technical data management | **Develop** (for a system) strategies to conduct technical data management | **Direct** (for a program) development of strategies to conduct technical data management |
| **4.6.2 Technical Data Collection and Storage**<br>a. Collect and store technical data<br>b. Record and distribute lessons learned<br>c. Perform technical data integrity checks | **Provide:**<br>• Data for storage<br>• Lessons learned | **Provide** (for a subsystem or small project):<br>• Data for storage<br>• Lessons learned | **Direct** (for a system):<br>• Data for storage<br>• Development of lessons learned | **Direct** (for a program):<br>• Data for storage<br>• Development of lessons learned |
| **4.6.3 Technical Data Maintenance**<br>a. Manage the databases<br>b. Perform technical data maintenance<br>c. Protect stored data | **Aware of** measures to protect technical data | **Aware of** measures to protect technical data | **Ensure** (for a system) measures to protect technical data | **Ensure** (for a program) measures to protect technical data |
| **4.6.4 Technical Data Access**<br>a. Maintain an information library<br>b. Process requests for technical data<br>c. Confirm that electronic access rules are followed<br>d. Provide proof of correctness, reliability and security of technical data | **Aware of** procedures to access technical data | **Contribute to** (for a subsystem or small project) development of procedures to access technical data | **Direct** (for a system) development of procedures to access technical data | **Direct** (for a program) development of procedures to access technical data<br><br>**Define** Agency/Center technical data management policies |
| **HQ courses** | | | | |

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| Center courses | | | | |
| OJL activities | | | | |
| Other learning activities | | | | |
| Assessment | | | | |

| Competency Area: 4.0 Technical Management | | | | |
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| **Competency: 4.7 Technical Assessment** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **4.7.1 Technical Assessment Preparation**<br>a. Prepare strategies for conducting technical assessments | **Aware of** activities to prepare for technical assessments | **Contribute to** (for a subsystem or small project) strategies to conduct technical assessments | **Develop** (for a system) strategies to conduct technical assessments | **Direct** (for a program) development of strategies to conduct technical assessments |
| **4.7.2 Technical Work Productivity Assessment**<br>a. Identify, collect, and analyze process measures<br>b. Monitor technical data management against plans | **Aware of** technical work productivity assessment | **Able to** (for a subsystem or small project):<br>• Identify process measures<br>• Monitor progress against plans | **Direct** (for a system) identification of process measures<br><br>**Monitor** (for a system) progress against plans | **Direct** (for a program) identification of process measures<br><br>**Monitor** (for a program) progress against plans |
| **4.7.3 Technical Product Quality Assessment**<br>a. Identify, collect, and analyze the degree of technical requirement and technical performance measures satisfaction<br>b. Determine any variances from expected values of product performance | **Aware of** quality assessment measures against technical requirements | **Participate in** (for a subsystem or small project) determination of:<br>• Degree to which product satisfies requirements<br>• Product performance variances and recommend corrective action | **Direct** (for a system) determination of:<br>• Degree to which product satisfies requirements<br>• Product performance variances<br><br>**Able to** select corrective action | **Direct** (for a program) determination of:<br>• Degree to which product satisfies requirements<br>• Product performance variances<br><br>**Able to** select corrective action |
| **4.7.4 Technical Reviews**<br>a. Identify the type of technical reviews<br>b. Determine progress toward satisfying entry criteria<br>c. Establish make up of the review team<br>d. Prepare the review | **Aware of** review types and their purposes<br><br>**Contribute to:**<br>• Review material preparation<br>• Identification and resolution of action items | **Able to** (for a small project or subsystem) identify type and when a technical review is needed<br><br>**Contribute to** (for a subsystem or small project):<br>• Review material preparation<br>• Action item identification and resolution | **Able to** (for a system) identify type and when a technical review is needed<br><br>**Direct** (for a system):<br>• Review material preparation<br>• Action item identification and resolution<br><br>**Able to** chair variety of | **Able to** (for a program) identify type and when a technical review is needed<br><br>**Direct** (for a program):<br>• Review material preparation<br>• Action item identification and resolution<br><br>**Able to** chair variety of review |

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| presentation materials<br>e. Identify and resolve action items | | | technical review boards (e.g. PDR, CDR, TRR) | boards for other projects (e.g. PNAR, NAR) |
| **4.7.5 Technical Assessment Documentation**<br>a. Capture technical assessment work products | **Contribute to** capture of work products from technical assessment activities | **Participate in** capture of work products from technical assessment activities | **Direct** (for a system) capture of work products from technical assessment activities | **Direct** (for a program) capture of work products from technical assessment activities<br><br>**Define** Agency/Center technical assessment policies |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

## Competency Area: 4.0 Technical Management

### Competency: 4.8 Technical Decision Analysis

| Competency Elements and Descriptions | Proficiency Level Descriptions | | | |
|---|---|---|---|---|
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **4.8.1 Decision Analysis Preparation**<br>a. Establish guidelines for when and how to use a formal decision making process | **Apply** decision making guidelines | **Contribute to** (for a small project or subsystem) guidelines for:<br>• When to use formal decision making<br>• Who will make decisions | **Develop** (for a system) guidelines for:<br>• When to use formal decision making<br>• Who will make decisions | **Direct** (for a program) development of guidelines for:<br>• When to use formal decision making<br>• Who will make decisions |
| **4.8.2 Criteria Definition**<br>a. Define types of criteria to include<br>b. Define acceptable range and scale of criteria<br>c. Rank each criterion by importance | **Contribute to** criteria definition | **Participate in** establishing criteria definition:<br>• Types and ranges<br>• Rank criteria | **Establish** (for a system) criteria definition:<br>• Types and ranges<br>• Rank criteria | **Direct** (for a program) establishment of criteria definition:<br>• Types and ranges<br>• Rank criteria |
| **4.8.3 Decision Alternatives**<br>a. Select evaluation methods and tools/techniques<br>b. Identify and evaluate alternative solutions<br>c. Select recommended solutions | **Contribute to** identification and evaluation of alternatives<br><br>**Able to:**<br>• Recommend evaluation method<br>• Recommend solution | **Able to**:<br>• Recommend evaluation method<br>• Identify and evaluate alternatives<br>• Recommend a solution | **Able to** (for a system) select:<br>• Evaluation method<br>• Solution<br><br>**Direct** (for a system) identification and evaluation of alternatives | **Able to** (for a program) select:<br>• Evaluation method<br>• Solution<br><br>**Direct** (for a program) identification and evaluation of alternatives |
| **4.8.4 Decision Analysis Documentation**<br>a. Capture decision analysis work products | **Contribute to** capture of work products from decision analysis activities | **Participate in** capture of work products from decision analysis activities | **Direct** (for a system) capture of work products from decision analysis activities | **Direct** (for a program) capture of work products from decision analysis activities<br><br>**Define** Agency/Center decision analysis policies |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 5.0 Project Management and Control | | | | |
|---|---|---|---|---|
| **Competency: 5.1 Acquisition Strategies and Procurement** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **5.1.1 Acquisition Strategies**<br>a. Identify technical inputs for acquisition strategies<br>b. Develop acquisition strategies | **Contribute to** acquisition strategy technical inputs | **Participate in** acquisition strategy development | **Direct** (for a system) effort to provide acquisition strategy technical inputs<br><br>**Contribute to** (for a system) acquisition strategy development | **Direct** (for a program) effort to provide acquisition strategy technical inputs<br><br>**Contribute to** (for a very large, complex project) acquisition strategy development |
| **5.1.2 Procurement**<br>a. Write technical proposals<br>b. Review and evaluate technical proposals<br>c. Execute acquisition instruments<br>d. Manage acquisition instruments | **Contribute to** technical proposal writing and evaluation<br><br>**Aware of** execution and management of acquisition instruments | **Participate in** technical proposal writing and evaluation<br><br>**Contribute to** execution and management of acquisition instruments | **Direct** (for a system) technical proposal writing and evaluation<br><br>**Participate in** (for a system) execution and management of acquisition instruments | **Direct** (for a program) technical proposal writing and evaluation<br><br>**Participate in** (for a program) execution and management of acquisition instruments |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 5.0 Project Management and Control | | | | |
|---|---|---|---|---|
| **Competency: 5.2 Resource Management** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **5.2.1 Resource Margin Determination**<br>a. Identify resources to be allocated and tracked<br>b. Provide resource estimates to include cost, schedule, and labor<br>c. Define acceptable resource margins<br>d. Allocate resources among subsystems | **Aware of** margins and how they are used to manage the project | **Identify** (for a subsystem or small project) resources to track<br><br>**Contribute to** (for a subsystem or small project) development of resource estimates and margins down to subsystem level | **Identify** (for a system) resources to track<br><br>**Direct** (for a system) development of resource estimates and margins down to subsystem level | **Identify** (for a program) resources to track<br><br>**Direct** (for a program) development of resource estimates and margins down to subsystem level |
| **5.2.2 Resource Tracking**<br>a. Implement earned value for systems engineering tasks<br>b. Monitor resources and margins and re-allocate as required<br>c. Provide status relative to cost, schedule, and technical progress | **Contribute to** resource tracking:<br>• Monitor assigned resources and margins using tools as appropriate<br>• Provide resource status inputs | **Participate in** resource tracking:<br>• Monitor resources and margins using tools as appropriate<br>• Provide resource status | **Manage** (for a system) resource tracking:<br>• Monitor resources and margins using tools as appropriate<br>• Provide resource status | **Manage** (for a program) resource tracking:<br>• Monitor resources and margins using tools as appropriate<br>• Provide resource status |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 5.0 Project Management and Control | | | | |
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| **Competency: 5.3 Contract Management** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **5.3.1 Contractor Monitoring**<br>a. Develop technical penetration/insight required for contractor activities<br>e. Monitor technical performance of contractors | **Contribute to:**<br>• Development of technical penetration of contractor<br>• Monitoring of contractor technical performance | **Participate in** (for a subsystem or small project) technical penetration of contractor<br><br>**Monitor** (for a subsystem or small project) contractor technical performance | **Develop** (for a system) technical penetration of contractor<br><br>**Monitor** (for a system) contractor technical performance | **Direct** (for a program) development of technical penetration of contractor<br><br>**Monitor** (for a program) contractor technical performance |
| **5.3.2 Technical Inputs**<br>a. Provide technical inputs for project contract management including change control | **Provide** technical inputs for contract management | **Develop** (for a subsystem or small project) technical inputs for contract management | **Develop** (for a system) technical inputs for contract management | **Develop** (for a program) technical inputs for contract management |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

## Competency Area: 5.0 Project Management and Control

### Competency: 5.4 Systems Engineering Management

| Competency Elements and Descriptions | Proficiency Level Descriptions | | | |
|---|---|---|---|---|
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **5.4.1 Systems Engineering Implementation**<br>a. Implement the SEMP and other technical plans<br>b. Monitor and report on Systems Engineering status | **Contribute to** portion of SE effort:<br>• Implement technical plans<br>• Monitor and report SE status | **Participate in** SE effort:<br>• Implement technical plans<br>• Monitor and report SE status | **Direct** (for a system) SE effort:<br>• Implement technical plans<br>• Monitor and report SE status | **Direct** (for a program) SE effort:<br>• Implement technical plans<br>• Monitor and report SE status |
| **5.4.2 Systems Engineering Management Responsibilities**<br>a. Evaluate systems engineering process and make improvements as necessary<br>b. Prioritize/reprioritize activities of technical teams<br>c. Integrate information across subsystems<br>d. Manage system engineering deliverables (e.g., technical baseline, TPMs, etc)<br>e. Monitor build-up of the system | **Aware of** SE management activities | **Contribute to** management of SE effort:<br>• Evaluate and make improvements<br>• Prioritize technical team activities<br>• Integrate information across subsystems<br>• Manage deliverables<br>• Monitor system build-up | **Able to** (for a system) manage SE effort:<br>• Evaluate and make improvements<br>• Prioritize technical team activities<br>• Integrate information across subsystems<br>• Manage deliverables<br>• Monitor system build-up | **Able to** (for a program) manage SE effort:<br>• Evaluate and make improvements<br>• Prioritize technical team activities<br>• Integrate information across subsystems<br>• Manage deliverables<br>• Monitor system build-up |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 6.0 NASA Internal and External Environments | | | | |
|---|---|---|---|---|
| **Competency: 6.1 Agency Structure, Mission, and Internal Goals** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **6.1.1 Agency Internal Environment**<br>a. Function within the Agency structure and culture<br>b. Align technical activities with Agency vision, mission, objectives, goals and plans | **Knowledge of:**<br>• Agency structure; goals at all levels; vision, mission, plans and objectives<br>• How to align technical activities and metrics with Agency vision, mission, plans, and objectives | **Perform** (for a subsystem or small project) system engineering activities within the Agency structure and across programs, Centers and NASA, as needed to achieve project and subsystem goals<br><br>**Contribute to** the alignment of a subsystem's technical activities and metrics with Agency vision, mission, plans, and objectives | **Lead and manage** (for a system) system engineering activities within the Agency structure and across programs, Centers and NASA, as needed to achieve project and system goals<br><br>**Lead and manage** (for a system) the alignment of a system's technical activities and metrics with Agency vision, mission, plans, and objectives<br><br>**Contribute** to the establishment of the Agency's technical requirements and infrastructure | **Establish** (for a program) the system engineering requirements needed to achieve program goals within the Agency structure and ensure mission success<br><br>**Make decisions** from an Agency perspective through the understanding of NASA's functional, social, cultural, and political environments to ensure mission success<br><br>**Lead** the alignment of a Agency's technical activities and metrics with Agency vision, mission, plans, and objectives<br><br>**Establish** the Agency's technical requirements and infrastructure to ensure mission success |
| **6.1.2 Center Internal Environment**<br>a. Function within the Center structure and culture<br>b. Align technical activities with Center vision, mission, objectives, goals and plans | **Knowledge of:**<br>• Center structure; goals at all levels; vision, mission, plans and objectives<br>• How to align technical activities and metrics with Center vision, mission, plans, and objectives | **Perform** (for a subsystem or small project) system engineering activities within the Center structure and across divisions and Center, as needed to achieve project and subsystem goals<br><br>**Contribute to** alignment of the subsystem's technical activities and metrics with Center vision, mission, plans, and objectives | **Perform** (for a system) system engineering activities within the Center structure and across divisions and Center, as needed to achieve project and system goals<br><br>**Lead and manage** (for a system) the alignment of the system's technical activities and metrics with Center vision, mission, plans, and objectives | **Lead** the alignment of a Center's technical activities and metrics with Agency vision, mission, plans, and objectives<br><br>**Establish** the Center's technical requirements and infrastructure to be aligned with Agency structure |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |

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| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 6.0 NASA Internal and External Environments | | | | |
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| **Competency: 6.2 NASA PM/SE Procedures and Guidelines** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **6.2.1 Agency PM/SE Procedures and Guidelines**<br>a. Structure technical activities to comply with relevant Agency processes and guidelines | **Knowledge of** NASA engineering of systems and PM policies and guidelines outlined in NASA procedures and guidelines documents | **Structure and manage** (for a subsystem or small project) technical activities to comply with NASA engineering of systems and PM policies and guidelines | **Structure and manage** (for a system) technical activities to comply with NASA systems engineering and PM policies and guidelines<br><br>**Contribute** to the review and development of Agency systems engineering policies and guidelines to ensure mission success | **Establish** (for a program) requirements for technical activities that comply with NASA systems engineering and PM policies and guidelines<br><br>**Assess** the Agency's technical processes and guidelines<br><br>**Lead** the review and development of Agency systems engineering policies and guidelines to ensure mission success |
| **6.2.1 Center PM/SE Procedures and Guidelines**<br>a. Structure technical activities to comply with relevant Center processes and guidelines | **Knowledge of** Center engineering of systems and PM policies and guidelines outlined in Center procedures and guidelines documents | **Structure and manage** (for a subsystem or small project) technical activities to comply with Center engineering of systems and PM policies and guidelines | **Structure and manage** (for a system) technical activities to comply with Center systems engineering and PM policies and guidelines<br><br>**Contribute** to the review and development of Center systems engineering policies and guidelines to ensure mission success | **Establish** (for a program) requirements for technical activities that comply with Center systems engineering and PM policies and guidelines<br><br>**Assess** the Center's technical processes and guidelines<br><br>**Lead** the review and development of Center systems engineering policies and guidelines to support Agency policy |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 6.0 NASA Internal and External Environments | | | | |
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| **Competency: 6.3 External Relationships** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **6.3.1 Professional Associations**<br>a. Membership and participation in professional societies/ organizations<br>b. Contribution to profession<br>c. Structure technical activities to conform to industry/professional standards, procedures, and regulations | **Participate in:**<br>• Professional societies/ organizations<br>• Technical activities that conform to industry/professional standards, procedures, and regulations | **Contribute to** professional societies/ organizations<br><br>**Maintain** knowledge of current up-to-date research and key individuals in the field<br><br>**Manage** (for a subsystem or small project) technical activities that conform to industry/ professional standards, procedures, and regulations | **Participate in leadership roles** within professional societies/ organizations<br><br>**Maintain** knowledge of current up-to-date research and key individuals in the field<br><br>**Lead and manage** (for a system) technical activities that conform to industry/ professional standards, procedures, and regulations<br><br>**Develop** key contacts within the discipline (both within and outside of NASA) | **Provide leadership** to professional societies/ organizations to guide the establishment of industry/professional standards, procedures, and regulations<br><br>**Contribute** to the knowledge and up-to-date research in the discipline<br><br>**Establish** (for a program) technical requirements that conform to industry/ professional standards, procedures, and regulations |
| **6.3.2 International Relationships (when engineering systems for or with international partners)**<br>a. Develop international partnerships and agreements<br>b. Comply with ITAR<br>c. Comply with international agreements and standards | **Aware of** international partnerships, agreements, standards, and ITAR as they relate to the team's technical activities | **Contribute to** (for a subsystem or small project) the development of international partnerships and agreements as they relate to the subsystem<br><br>**Comply** with ITAR and international agreements and standards as they relate to the subsystem | **Lead and manage** (for a system) the development of international partnerships and agreements as they relate to the system<br><br>**Comply** with ITAR and international agreements and standards as they relate to the system | **Establish** international partnerships and agreements to ensure mission success<br><br>**Comply** with ITAR and international agreements and standards as they relate to the program |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 7.0 Human Capital Management | | | | |
|---|---|---|---|---|
| **Competency: 7.1 Technical Staffing and Performance** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **7.1.1 Staffing Function**<br>a. Define roles and responsibilities of the technical workforce<br>b. Identify and obtain the required technical personnel resources | **Understand** the roles and responsibilities of each member of a technical team<br><br>**Aware of** NASA's processes for selecting, staffing, and evaluating teams | **Define** (for a subsystem of small project) the technical team members' roles and responsibilities for performing technical activities<br><br>**Assist in identifying and obtaining** the required technical personnel resources for developing a subsystem<br><br>**Ensure** that the technical team members (for a subsystem of small project) have the appropriate skills, expertise, and experience | **Integrate** (for a system) the technical team members' roles and responsibilities<br><br>**Employ** skills analysis and team selection techniques to build technical teams (for a system) with complementary talents and the necessary skills, expertise, and experiences<br><br>**Contribute to the assessment** of the Agency's technical workforce's capabilities and gaps for achieving mission success | **Establish** staffing strategies and selection criteria for recruiting, evaluating, selecting and staffing technical teams for a program<br><br>**Identify** and obtain the required technical leadership personnel resources for a program<br><br>**Establish** the Agency's technical workforce personnel and infrastructure requirements to ensure mission success<br><br>**Lead the assessment** of the Agency's technical workforce's capabilities and gaps for achieving mission success |
| **7.1.2 Performance Assessment**<br>a. Monitor performance of technical workforce<br>b. Achieve desired performance level of the technical workforce | **Understand and achieve** the desired performance level for the assigned technical activities<br><br>**Monitor** own technical performance level | **Monitor** (for a subsystem or small project) the performance of a subsystem's technical team members<br><br>**Apply** appropriate team management techniques and concepts to guide a qualified technical team (for a subsystem or small project) toward maintaining the desired performance level | **Establish** (for a system) the desired performance level of the system's technical workforce<br><br>**Establish** (for a system) the performance criteria for the system's technical workforce<br><br>**Monitor** the subsystems leads' performance | **Establish** performance criteria for a program's technical workforce to ensure mission success<br><br>**Monitor** the program's systems engineers' performance<br><br>**Establish** the desired performance level for the Agency's technical workforce |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

## Competency Area: 7.0 Human Capital Management

### Competency: 7.2 Team Dynamics and Management

| Competency Elements and Descriptions | Proficiency Level Descriptions | | | |
|---|---|---|---|---|
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **7.2.1 Team Development**<br>a. Motivate and reward technical team members' performance<br>b. Manage relationships among technical team members | **Understand** team members' roles and responsibilities, how they interact as a unit, and what motivates them to achieve peek performance<br><br>**Understand** own roles, responsibilities, and desired performance level for performing technical activities<br><br>**Manage** own relationships among technical team members | **Employ** appropriate team management techniques and concepts to effectively develop and motivate a technical team (for a subsystem or small project)<br><br>**Understand** (for a subsystem or small project) each technical team member's capabilities, function, and the interrelationships among them<br><br>**Manage** the relationships among technical team members (for a subsystem or small project) | **Communicate** the technical team's direction and focus to ensure mission success<br><br>**Implement** the incentive program for motivating and rewarding the technical team members' performance (for a system)<br><br>**Apply** appropriate team management techniques and concepts to build on a technical team members' capabilities and functions in order to facilitate the interrelationships and improve team performance | **Establish and communicate** the direction and focus of a program's technical leadership team to ensure mission success<br><br>**Establish** the incentive program to enhance performance and productivity of a program's technical workforce teams<br><br>**Establish and manage** productive relationships among a program's technical leadership team in order to ensure mission success |
| **7.2.2 Team Processes**<br>a. Establish and manage interfaces and relationships with technical team members, customers, stakeholders and partners<br>b. Facilitate brainstorming, conflict resolution, negotiation, and problem solving<br>c. Facilitate communication, collaboration and integration | **Understand** the relationships between technical team members, customers, stakeholders and partners<br><br>**Participate** in team brainstorming, conflict resolution, negotiation, and problem solving activities<br><br>**Understand and work within** the team's communication, collaboration and integration dynamics | **Manage** (for a subsystem or small project) interfaces and relationships with the technical team members, customers, stakeholders and partners<br><br>**Lead** (for a subsystem or small project) brainstorming, conflict resolution, negotiation, and problem solving activities for the technical team<br><br>**Establish and facilitate** (for a subsystem or small project) the communication, collaboration, and integration dynamics for the technical team | **Establish and manage** (for a system) the interfaces and relationships with the technical team members, customers, stakeholders and partners<br><br>**Create** an environment within the technical team (for a system) that fosters opportunities to conduct activities for brainstorming, conflict resolution, negotiation, and problem solving<br><br>**Manage** the group dynamics and cooperation of the technical team (for a system) to facilitate communication, collaboration, and integration in order to ensure mission success | **Identify and manage** the interfaces and relationships among the stakeholders and partners that may impact program and mission success<br><br>**Determine and mitigate** long-term consequences of any impacts resulting from interfaces and relationships among the stakeholders and partners<br><br>**Employ** a range of conflict resolution techniques to bring about positive change and commitment, build trust and respect, and mitigate the negative effects of conflict<br><br>**Create** an open and non-critical environment, that |

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| | | | | facilitates collaboration, communication, and individual empowerment to insure mission success |
| **7.2.3 Team Meetings**<br>a. Plan effective technical team meetings<br>b. Facilitate effective technical team meetings | **Contribute to** the outcomes of technical team meetings to enhance success | **Plan, lead and facilitate** (for a subsystem or small project) effective technical team meetings | **Establish** a system's technical team meeting's requirements that align with the program's requirements<br><br>**Plan, lead and facilitate** (for a system) effective technical team meetings | **Establish** a program's technical team meeting's requirements to ensure mission success<br><br>**Plan, lead and facilitate** (for a program) effective technical leadership team meetings |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 8.0 Security, Safety and Mission Assurance | | | | |
|---|---|---|---|---|
| **Competency: 8.1 Security** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **8.1.1 IT Security**<br>a. Identify IT security requirements<br>b. Develop and implement IT security plan | **Participate** in the identification of IT security requirements<br><br>**Aware** of the IT security plan and its impact on the team's technical activities | **Manage** (for a subsystem or small project):<br>• Identification of IT security requirements for the subsystem<br>• Development and implementation of the IT security plan for the subsystem | **Lead and Manage** (for a system):<br>• Identification of IT security requirements for the system<br>• Development and implementation of the IT security plan for the system<br><br>**Contribute** to the establishment of program and/or Agency requirements for IT security for the systems engineering | **Establish** program requirements for IT security for the systems engineering<br><br>**Lead** the development of IT security for the systems engineering |
| **8.1.2 Other Security Related Issues**<br>a. Identify other security requirements<br>b. Develop and implement security plan | **Participate** in the identification of other security requirements related to the subsystem<br><br>**Aware** of the security plan for the subsystem and its impact on the team's technical activities | **Manage** (for a subsystem or small project):<br>• Identification of other security requirements related to the subsystem<br>• Development and implementation of a security plan for the subsystem | **Lead and Manage** (for a system):<br>• Identification of other security requirements related to the system<br>• Development and implementation of a security plan for the system<br><br>Contribute to the establishment of **program** and/or Agency requirements for IT security for the systems engineering | **Establish** program requirements for other security related to systems engineering<br><br>**Lead** the development of other security related to systems engineering |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 8.0 Security, Safety and Mission Assurance | | | | |
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| **Competency: 8.2 Safety and Mission Assurance** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **8.2.1 System Safety Planning and Management**<br>a. Identify relevant safety regulations/ procedures<br>b. Assess potential hazards<br>c. Monitor and control, eliminate, or reduce hazards<br>d. Perform system safety analysis<br>e. Verify system safety<br>f. Conduct failure resolution and reporting | **Participate in:**<br>• Identifying relevant safety regulations/ procedures and assessing potential hazards for a subsystem<br>• Performing system safety analysis, verifying system safety, and conducting failure resolution and reporting | **Manage** the safety planning and implementation (for a subsystem or small project):<br>• Identify relevant safety regulations/ procedures<br>• Assess potential hazards<br>• Monitor and control, eliminate, or reduce identified hazards<br>• Perform subsystem safety analysis<br>• Verify subsystem safety<br>• Conduct failure resolution and reporting | **Lead and manage** the system safety planning and implementation for a system<br><br>**Review** subsystem safety plans and implementation for the program<br><br>**Employ** systems safety concepts and Continuous Risk Management procedures to identify and evaluate systems engineering safety threats<br><br>**Contribute** to the development of system safety planning and management policy and procedures (for a program and the Agency) | **Establish** system safety planning and management policy and procedures for a program<br><br>**Review** system safety plans and implementation for aprogram<br><br>**Ensure** that system safety hazards within a program are identified controlled and/or eliminated<br><br>**Provide** proactive leadership to improve systems engineering safety in a program<br><br>**Lead** the development of system safety planning and management policy and procedures for the Agency |
| **8.2.2 Safety Management**<br>a. Identify and manage test safety<br>b. Identify and manage operations safety<br>c. Identify and manage industrial safety | **Aware** of safety management activities that relate to assigned technical activities and subsystem | **Identify and manage** (for a subsystem or small project):<br>• Test safety for the subsystem<br>• Operations safety for the subsystem<br>• Industrial safety | **Identify and manage** (for a system):<br>• Test safety for the system<br>• Operations safety for the system<br>• Industrial safety<br><br>**Review** system safety management activities for subsystems | **Review** system safety management activities for the program<br><br>**Foster** a safety culture throughout the program by advocating engineering excellence |
| **8.2.3 Safety and Mission Assurance Planning and Management**<br>a. Identify Mission assurance requirements<br>b. Develop Safety and Mission assurance plan, | **Understand and comply** with NASA safety and mission assurance strategies, policies, and standards<br><br>**Participate** in identifying mission assurance requirements | **Identify** (for a subsystem or small project) mission assurance requirements for a subsystem<br><br>**Develop** (for a subsystem or small project) Safety and Mission Assurance: | **Identify** (for a system) mission assurance requirements for the system<br><br>**Develop** (for a system) Safety and Mission Assurance:<br>• Plan for the system, including system quality, | **Identify** mission assurance requirements for a program<br><br>**Review** system safety and mission assurance activities for a program<br><br>**Develop** Safety and Mission |

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| including system quality, reliability and maintainability<br>c. Develop Safety and Mission assurance implementation strategies | **Able** to follow Safety and Mission Assurance plan as it relates to technical activities for a subsystem | • Plan for the subsystem, including system quality, reliability and maintainability, that complies with NASA safety and mission assurance strategies, policies, and standards<br>• Implementation strategies | reliability and maintainability, that complies with NASA safety and mission assurance strategies, policies, and standards<br>• Implementation strategies<br><br>**Review** system safety and mission assurance activities for subsystems | Assurance policy and procedures (for a program and/or Agency) |
| **8.2.4 Safety and Mission Assurance Reviews**<br>a. Prepare for and participate in Safety and Mission Assurance Readiness Review (SMARR)<br>b. Prepare for and participate in Program Audit and Review (PA&R) process<br>c. Prepare for and participate in Certificate of Flight Readiness (CoFR) process | **Contribute to:**<br>• Safety and Mission Assurance Readiness Review<br>• Program Audit and Review process<br>• Certificate of Flight Readiness process | **Contribute to** preparing for and participating in:<br>• Safety and Mission Assurance Readiness Reviews<br>• Program Audit and Review process<br>• Certificate of Flight Readiness process | **Lead** (for a system) the activities to prepare the system for and participate in:<br>• Safety and Mission Assurance Readiness Reviews<br>• Program Audit and Review process<br>• Certificate of Flight Readiness process<br><br>**Participate** in review boards for other projects and programs | **Chair** engineering and safety review boards:<br>• Safety and Mission Assurance Readiness Reviews<br>• Program Audit and Review process<br>• Certificate of Flight Readiness process |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 9.0 Professional and Leadership Development | | | | |
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| **Competency: 9.1 Mentoring and Coaching** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **9.1.1 Mentoring and Coaching Tasks**<br>a. Provide advice and guidance<br>b. Teach juniors<br>c. Receive periodic personal coaching to improve identified weaknesses | **Secure** own mentor to receive advice and guidance<br><br>**Receive** periodic personal coaching to improve identified weaknesses | **Identify** technical team members' key strengths and opportunities for development in order to enhance performance<br><br>**Serve** as a mentor to at least one team member of a subsystem technical team, meeting on a regular basis to provide advice and guidance<br><br>**Secure** own mentor to receive advice and guidance<br><br>**Apply** coaching skills to improve, sustain and/or enhance technical performance of team members (for a small project or subsystem)<br><br>**Receive** periodic personal coaching from a systems engineer to improve identified weaknesses | **Provide** guidance to enhance performance, facilitate success, and build commitment.<br><br>**Serve** as a mentor to at least one subsystem engineer, meeting on a regular basis to provide advice and guidance<br><br>**Secure** own mentor to receive advice and guidance<br><br>**Apply** coaching skills to improve, sustain and/or enhance technical performance of team members for a complex project<br><br>**Receive** periodic personal coaching to improve identified weaknesses | **Communicate** expertise, advice, and knowledge effectively for the purpose of broadening the proficiency of others, positively influencing decision-making, and establishing cooperative relationships<br><br>**Serve** as a mentor to at least one system engineer, meeting on a regular basis to provide advice and guidance<br><br>**Advocate** for and support mentoring and coaching resources for system engineers<br><br>**Establish** a coaching and mentoring climate within the technical team<br><br>**Receive** periodic personal coaching to improve identified weaknesses |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 9.0 Professional and Leadership Development | | | | |
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| **Competency: 9.2 Communication** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **9.2.1 Technical Communication**<br>a. Write technical information<br>b. Present technical information<br>c. Communicate technical decisions | **Develop** own ability to effectively write and present technical information, as well as communicate technical decisions | **Write and present** (for a subsystem or small project) technical information, as well as communicate technical decisions, relating to the subsystem's technical activities<br><br>**Effectively and concisely** communicate technical information to provide a comprehensive and concise recommendation | **Write and present** (for a system) technical information, as well as communicate technical decisions, relating to the system's technical activities<br><br>**Lead and manage** (for a system) the communication of technical information and technical decisions relating to the system's technical activities<br><br>**Communicate** effectively and concisely technical information to provide a comprehensive and concise recommendation to top management | **Write and present** to Center and HQ management technical information, as well as communicate technical decisions, relating to technical activities for a program<br><br>**Establish** processes and procedures to communicate technical information and technical decisions relating to a program's technical activities<br><br>**Establish** processes and procedures to communication of technical information and technical decisions relating to the Agency's technical activities |
| **9.2.2 Reporting Results**<br>a. Write reports<br>b. Present reports | **Develop** own ability to write and present reports that communicate technical status, challenges, problem solutions and/or accomplishments | **Write and present** reports that effectively communicate technical status, challenges, problem solutions and/or accomplishments for a subsystem in order to provide a comprehensive account of a particular phenomenon<br><br>**Review** the technical reports of others to insure quality and accurate reporting of technical information<br><br>**Communicate** the results of a technical assessments, analyses, reviews, and/or investigations | **Write and present** reports that effectively communicate technical status, challenges, problem solutions and/or accomplishments for a system in order to provide a comprehensive account of a particular phenomenon<br><br>**Lead and manage** (for a system) the writing and presenting of technical reports that effectively and concisely communicate the results of a technical assessment, analysis and/or investigation and provides evidence based recommendations<br><br>**Review** the technical reports of | **Write and present** reports to Center and HQ management that effectively communicate technical status, challenges, problem solutions and/or accomplishments for a program<br><br>**Communicate** the results of a technical assessment, analysis and/or investigation that is targeted to a particular audience and provides a comprehensive account of engineering issues, as well as evidence-based recommendations |

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| | | | subsystem leads to insure quality and accurate reporting of technical information<br><br>**Communicate** technical information from a variety of data sources that is targeted to a particular audience and provides an evidence-based, comprehensive account of a phenomenon concerning systems engineering issues related to a system | |
| **9.2.3 Interpersonal Communication**<br>a. Demonstrate skills in speaking and writing (both formally and informally) for understanding<br>b. Demonstrate skills in listening for understanding | **Demonstrate skills in:**<br>• Speaking and writing (both formally and informally) for understanding<br>• Demonstrate skills in listening for understanding | **Apply appropriate skills** for using a variety of media to effectively communicate technical information about a subsystem<br><br>**Promote communication approaches** that establish an open and positive environment within a subsystem's technical team<br><br>**Model and encourage** listening skills that include involving, responding, and appreciating behaviors. | **Apply appropriate skills** for using a variety of media to effectively communicate technical information about a system<br><br>**Promote communication approaches** that establish an open and positive environment within a system's technical team<br><br>**Create** an environment in the technical team of a system that encourages listening, involving, responding, and appreciating behaviors | **Create** an environment that facilitates positive communication approaches within the technical workforce of a program<br><br>**Communicate** and **advocate** information regarding technical information to high levels of Government and pubic media |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

| Competency Area: 9.0 Professional and Leadership Development | | | | |
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| **Competency: 9.3 Leadership** | | | | |
| **Competency Elements and Descriptions** | **Proficiency Level Descriptions** | | | |
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **9.3.1 Delegating Function**<br>a. Assign, delegate, and reassess technical tasks/ work assignments<br>b. Define success criteria for performing technical tasks/ work assignments<br>c. Track and manage success criteria for performance | **Understand** own technical tasks / work assignments and performance success criteria<br><br>**Track and manage** own performance to insure achievement of success criteria | **Assign, delegate, and reassess** (for a subsystem or small project) technical tasks/ work assignments<br><br>**Implement** (for a subsystem or small project) success criteria for performing technical tasks/ work assignments<br><br>**Track and manage** (for a subsystem or small project) success criteria for technical performance | **Assign, delegate, and reassess** technical tasks/ work assignments (for a system)<br><br>**Contribute** to defining the success criteria for performing technical tasks/ work assignments for a system<br><br>**Implement** (for a system) success criteria for performing technical tasks/ work assignments<br><br>**Track and manage** (for a system) success criteria for technical performance | **Develop** technical tasks/ work assignments for the leadership team for a program<br><br>**Define** success criteria for performing technical tasks/ work assignments for a program<br><br>**Conduct** trend analyses of significant trends and/or anomalies concerning technical performance and develop a proactive recommendations for the program |
| **9.3.2 Influencing Role**<br>a. Provide vision, direction, and guidance<br>b. Motivate and inspire individuals to perform technical tasks/ work assignments successfully<br>c. Recognize and reward accomplishments<br>d. Establish and maintain collaborative and open work environment | **Understand:**<br>• Leadership techniques by focusing on strategies for personal and team professional growth<br>• Power of influence, motivation, vision, and resolve, as well as the relationship between leading and managing<br><br>Function to **maintain** a collaborative and open work environment | **Provide** (for a subsystem or small project) vision, direction, and guidance for technical activities<br><br>**Motivate and inspire** (for a subsystem or small project) members of the subsystem's technical team to perform technical tasks/ work assignments successfully<br><br>**Recognize** and reward (for a subsystem or small project) the accomplishments of members of the subsystem's technical team<br><br>**Establish and maintain** (for a subsystem or small project) a collaborative and open work environment within the subsystem's technical team | **Provide** vision, direction, and guidance for technical activities for a system<br><br>**Employ** leadership techniques that encourage individual empowerment and guides individuals toward the successful obtainment of their goals<br><br>**Motivate and inspire** (for a system) members of the system's technical team to perform technical tasks/ work assignments successfully<br><br>**Recognize** and reward (for a system) the accomplishments of members of the system's technical team<br><br>**Establish and maintain** (for a | **Provide** vision, direction, and guidance for technical activities for a program<br><br>**Employ** empowerment strategies to initiate ideas and actions from others that foster technical innovations to support mission success<br><br>**Communicate** expertise, advice, and knowledge effectively for the purpose of broadening the proficiency of others, positively influencing decision-making, and establishing cooperative relationships<br><br>**Establish and maintain** an environment within the program's technical workforce that promotes motivation, |

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| | | | system) a collaborative and open work environment within the system's technical team | positive recognition, and collaboration |
| **9.3.3 Decision-Making and Solving Problems**<br>a. Define problem<br>b. Establish solution criteria<br>c. Evaluate alternatives<br>d. Determine solution(s) based on facts, evidence, criteria and risk | **Participate** in a technical team's decision-making and problem solving activities<br><br>**Understand and follow** the technical team's decision-making and problem-solving processes | **Manage** a subsystem's technical team's decision-making and problem solving processes<br><br>**Lead** a subsystem's technical team in decision-making and problem solving activities<br><br>**Evaluate and select** among alternative approaches, concepts, architectures, etc**.** | **Manage** a system's technical team's decision-making and problem solving processes<br><br>**Lead** (for a system) the system's technical team in decision-making and problem solving activities<br><br>**Employ** team decision-making techniques that foster consensus building, while allowing for minority opinions, and resulting in evidence-based decisions | **Establish** the technical workforce decision-making and problem solving processes for technical activities for a program<br><br>**Create** an environment that encourages consensus building, as well as minority opinions, and results in decisions that are based on sound evidence<br><br>**Employ** analytical decision-making tools and knowledge within a systematic framework to make effective evidence-based decision |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |

## Competency Area: 10.0 Knowledge Management

### Competency: 10.1 Knowledge Capture and Transfer

| Competency Elements and Descriptions | Proficiency Level Descriptions | | | |
|---|---|---|---|---|
| | Level 1 | Level 2 | Level 3 | Level 4 |
| **10.1.1 Lessons Learned Documentation**<br>a. Identify lessons learned from system engineering activities<br>b. Record lessons learned from system engineering activities<br>c. Evaluate lessons learned/best practices of system engineering activities and related significant studies | **Contribute** to the technical team's lessons learned activities<br><br>**Aware** of lessons learned/best practices from previous programs, projects and significant studies | **Manage** (for a subsystem or small project) the identification and documentation of systems engineering activities, including their impact on project history and lessons learned<br><br>**Captures** appropriate knowledge and trends relating to engineering issues within the subsystem in order to input into a knowledge management<br><br>**Evaluate** lessons learned/best practices from previous programs, projects and significant studies | **Manage and integrate** (for a system) the identification and documentation of systems engineering activities, including their impact on project history and lessons learned<br><br>**Implement** proper knowledge management strategies that provide integration of technical knowledge and information from reports, trend analyses, and lessons learned into a knowledge management system that will enable proactive information use, assist in problem-solving, and improve decision-making.<br><br>**Evaluate** lessons learned/best practices from previous programs, projects and significant studies<br><br>**Develop** lesson-learned case studies based on NASA engineering experiences that can benefit the Agency and junior engineers | **Lead** (for a program) the identification and documentation of systems engineering activities, including their impact on project history and lessons learned<br><br>**Establish** proper knowledge management strategies that will facilitate communication, enable proactive information use, improve/enhance decision-making, expedite best-practices in engineering, and transfer lessons-learned.<br><br>**Coordinate** the development and maintenance of an engineering knowledge management system that is useful for improving decision-making, information sharing, and resolving engineering issues.<br><br>**Promote and require** the effective application of lessons learned/best practices from previous programs, projects and significant studies |
| **10.1.2 Work Products**<br>a. Capture work products throughout the product life cycle<br>b. Make work products available to appropriate users/stakeholders | **Contribute** to the technical team's capture of work products<br><br>**Aware** of access to work products by appropriate users | **Manage** (for a subsystem or small project) the capture of work products, including decision(s) made, supporting rationale and assumptions, and any corrective actions<br><br>**Provide** access to the work products of a subsystem to | **Manage** (for a system) the capture of work products, including decision(s) made, supporting rationale and assumptions, and any corrective actions<br><br>**Provide** access to the work products of a system to | **Establish processes** (for a program) for the capture of and access to work products, including decision(s) made, supporting rationale and assumptions, and any corrective actions<br><br>**Establish policy and** |

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| | | appropriate users | appropriate users | **processes** for the Agency concerning the capture of and access to work products |
| **HQ courses** | | | | |
| **Center courses** | | | | |
| **OJL activities** | | | | |
| **Other learning activities** | | | | |
| **Assessment** | | | | |